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PHOTOGRAPHS OF THE SUN AT MT. HAMILTON.

By Edward S. Holden.

The original programme of work at the Lick Observatory included making daily photographs of the Sun with a 40-foot photoheliograph.*

Some attempts to begin such a series were made in the years 1888–1892. In 1893 Mr. Perrine, Secretary of the Observatory, volunteered to undertake this work. Since that time we have a very complete record of Sun-spots. As no publication regarding this series of photographs has yet been made, I have asked Mr. Perrine to prepare the following memorandum. The available force of the Observatory is not now sufficient to make the necessary measures and reductions of these negatives. The photographs remain on file at the Observatory and they, or copies of them, are at the disposal of any astronomer, or Society, who may have the disposition to measure and discuss them. In general, the negatives are promptly developed and examined. The situation of the photoheliograph is not very favorable, but many of these negatives show fine definition and can be advantageously enlarged 5 or 6 diameters.

MEMORANDUM ON NEGATIVES OF THE SUN TAKEN WITH THE PHOTOHELIOGRAPH IN 1893–94.

The objective was placed in position and the first Sun photographs taken July 8, 1893. Between that date and December 15, 1894, exposures were made on 362 days. The days omitted include, besides cloudy ones, absences of 42 days. The number of days available would be materially increased if the photoheliograph were so situated as to receive the Sun's rays earlier in the morning and later in the afternoon.

About 950 negatives have already been made, of which something like 800 have been kept. The aim has been to select a pair of the best for each day. If only two were taken in a day, *both* were kept. If more were taken, then duplicates of the best were selected (for each of the hours, if exposures were made more than once a day) and the rest presented to the Astronomical Society of the Pacific, or destroyed. When practicable, duplicate negatives have been made as a check against imperfections in the film.

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* *Publications* A. S. P., Vol. IV, page 143.

The objective is of 5 inches aperture, but is stopped down to 3 inches, and the focal length is approximately 40 feet, giving an image of the Sun varying from 4⅜ to $4\frac{9}{16}$ inches in size. The exposure is made by a shutter falling in front of the sensitive plate. This shutter has a horizontal slit with adjustable jaws, so that the width of the opening may be varied. In practice the correct exposure is gotten by using a width of the slit which varies from about ¼ inch in summer to ½ inch in winter.

The length of the exposure varies from about $\frac{1}{400}$ second to $\frac{1}{200}$ second. The time at which the exposure is made, is gotten from a sounder in the dark room which gives the beats of the mean-time clock. These times are recorded to the nearest second. Very slow plates are used.

C. D. PERRINE.

THE NEW STAR OF 1892.

BY W. W. CAMPBELL.

We cannot doubt that all the stars are undergoing continual and progressive changes of condition. These changes are exceedingly slow and require long periods of time to become appreciable. In general, astronomers are not permitted to detect and record them. It is true that in the variable stars we observe rapid variations, both in brightness and in the appearance of their spectra; but so far as we know they occur in cycles. They repeat themselves and there are no evidences of permanent and progressive changes.*

The so-called "new stars" are in that respect an important exception. They change rapidly, both in brightness and physical condition, and in that fact lies their very great significance.

The interesting history of the new star in *Auriga* is well known. It appeared in December, 1891. Its spectrum was a very complex one, consisting of bright and dark lines and continuous

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* There is some evidence of variations in brightness of a few stars during historic times, but there is no evidence of a change in their physical condition, such as would be indicated by a change in their spectra.